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Education

Undergraduate: University of London, UK; B.S., Biochemistry, 1976
Graduate: University of London, UK; Ph.D., Biochemistry, 1979

Appointments

1996-present: Distinguished Research Professor, University of Georgia, Athens, GA 30602
1994-present: Professor, Department of Biochemistry and Molecular Biology, and Adjunct Professor, Department of Microbiology, University of Georgia, Athens, GA
1991-1994: Associate Professor, Department of Biochemistry, University of Georgia
1987-1991: Assistant Professor, Department of Biochemistry, University of Georgia
1984-1987: Senior Biochemist, Exxon Research, Annandale, NJ 08801
1981-1983: Research Biochemist, Exxon Research, Linden, NJ 07036
1979-1981: Post-doctoral Research Associate, Purdue University, IN 47906

Recent Publications (total refereed publications: 287)

- Zhang, Y. H. P., Evans, B. R., Mielenz, J. R., Hopkins, R. C. and Adams, M. W. W. (2007) "High yield hydrogen production from starch and water by a synthetic enzyme pathway" *PLoS One* 5, e456 (1-6)
- Chou, C. J., Shockley, K. R., Conners, S. B., Lewis, D. L., Comfort, D. A., Adams, M. W. W. and Kelly, R.M. (2007) "Impact of substrate glycoside linkage and elemental sulfur on bioenergetics and hydrogen production by the hyperthermophilic archaeon *Pyrococcus furiosus*" *Appl. Environ. Microbiol.* 73, 6842-6853
- Schut, G., Bridger, S. L. and Adams, M. W. W. (2007) "Insights into the metabolism of elemental sulfur by the hyperthermophilic archaeon *Pyrococcus furiosus*: characterization of a coenzyme A-dependent NAD(P)H sulfur oxidoreductase" *J. Bacteriol.* 189, 4431-4441
- Dey, A., Jenney, F. E., Jr., Adams, M. W. W., Babini, E., Takahashi, Y., Fukuyama, K., Hodgson, K. O., Hedman, B. and Solomon, E. I. (2007) "Solvent tuning of electrochemical potentials in the active sites of HiPIP versus ferredoxin" *Science* 318, 1464-1468
- Jenney, F. E., Jr. and Adams, M. W. W. (2007) "The impact of structural genomics on extremophiles (and vice versa)" *Extremophiles* [Jun. 13, Epub] (in press)
- Cacciapuoti, G., Porcelli, M., Moretti, M. A., Zappia, V., Liu, Z.-J., Tempel, W., Schubot, F., Rose, J. P., Wang, B.-C., Brereton, P. S., Jenney, F. E. and Adams, M. W. W. (2007) "The first agmatine/cadaverine aminopropyl transferase: biochemical and structural characterization of the enzyme involved in polyamine biosynthesis in the hyperthermophilic archaeon *Pyrococcus furiosus*" *J. Bacteriol.* 189, 6057-6067
- Vondrasek, J., Kubar, T., Jenney, F. E. Jr., Adams, M. W. W., Kozisek, M., Cerny, J., Sklenar, V. and Hobza, P. (2007) Dispersion interactions govern the strong thermal stability of a protein" *Chemistry* 3, 9022-9027
- Dey, A., Jenney Jr., F. E., Adams, M. W. W., Johnson, M. K., Hodgson, K. O., Hedman, B. and Solomon, E. I. (2007) "Sulfur K-edge XAS and DFT calculations on superoxide reductase: Role of the axial thiolate in reactivity" *J. Am. Chem. Soc.* 129, 12418-12431
- Gerwe, B., Kelley, L.-L. K., Dillard, B. D., Lai, T., Liu, Z.-J., Tempel, W., Chen, L., Habel, J., Lee, D., Jenney, F. E. Jr., Sugar, F. J., Richardson, J. S., Richardson, D. C., Newton, M. G., Wang, B.-C., Adams, M. W. W. and Rose, J. P. (2007) "Structural and transcriptional analyses of a purine nucleotide-binding protein from *Pyrococcus furiosus*: a component of a novel, membrane-bound multiprotein complex unique to this hyperthermophilic archaeon" *J. Struct. Funct. Genomics* 8, 1-10
- Tran, T. T., Dam, P., Su, P., Poole, F. P., Adams, M. W. W., Zhou, G. T. and Xu, Y. (2007) "Operon prediction in *Pyrococcus furiosus*" *Nucleic Acid Res.* 35, 11-20

Service, Honors and Awards

2001 – present: Editor: *Journal of Bacteriology*
2003: Elected Member of the American Academy of Microbiology

Current Funding

"*Molecular Assemblies, Genes and Genomics Integrated Efficiently*", Genomes GTL Program, Department of Energy, DE-FG02-07ER64326
"Fundamental Studies of Recombinant Hydrogenases", Department of Energy (DE-FG02-05ER15710)
"The Metabolism of Hydrogen by Hyperthermophilic Microorganisms", Department of Energy (FG05-95ER20175)
"Novel Responses to Oxygen Toxicity by Anaerobic Microorganisms", National Institutes of Health (GM 60329)
"Biotransformations Near and Above 100°C: Hyperthermophilic Microorganisms and Enzymes for Bioenergy Conversion", National Science Foundation (BES-061723)
"Conversion of Biomass to Biofuels using Hyperthermophilic Microorganisms and Enzymes Near and Above 100° C", Georgia Research Alliance
BioEnergy Science Center - GTL Bioenergy Centers, Department of Energy (DE-PS02-06ER64304)

Research Interests

Our research concerns hyperthermophiles, which are microorganisms that grow near and even above 100°C. The main focus is with the archaeon *Pyrococcus furiosus* (Pf), which grows optimally at the boiling point. The Pf genome contains 2,200 genes and a proteomics effort is in progress involving the large-scale fractionation of native biomass to identify macromolecular assemblies on a genome-wide basis. These include multiprotein complexes that contain metals, RNA and metabolites. A functional genomics effort is also underway in which DNA microarrays representing the complete genome are being used to investigate the response of Pf to various stress conditions. These include low temperature (~70°C), limiting amounts of iron and sulfur, and the presence of reactive oxygen and nitrogen species. Novel proteins involved in these responses are being characterized by a variety of biochemical, molecular and spectroscopic techniques. Hyperthermophiles are also of great interest in the bioenergy field as they can metabolize various types of biomass to produce hydrogen gas, a potential biofuel. Three additional projects currently underway seek to understand the nature of the enzymes that are involved in biomass conversion and hydrogen production. We are using Pf and *Thermotoga maritima*, a hyperthermophilic bacterium that grows at 90°C, as model systems. Newly-isolated hyperthermophiles are also being characterized for their potential use in biomass conversion and as sources of novel types of enzymes.